Kingdom of Saudi Arabia
Ministry of Interior
High Commission for Industrial Security
Secretariat General

المملكة العربية السعودية
وزارة الداخلية
الهيئة العليا للأمن الصناعي
الأمانة العامة

SAFETY AND FIRE PROTECTION DIRECTIVES FOR LIGHT INDUSTRIAL & NON-INDUSTRIAL FACILITIES

نسخة مرخصة لشركة

2017

نسخة مرخصة لـ شركة المياه الوطنية

INTRODUCTION

The High Commission for Industrial Security (HCIS) Directives for Light Industrial and Non-Industrial Facilities set forth the framework under which HCIS specifies security, safety, and fire protection requirements for facilities that are not covered by the HCIS Directives for Industrial Facilities.

These facilities include but are not limited to those associated with water treatment plants, potable water storage and distribution piping, scientific research organizations and railways.

Compliance with these directives is a statutory requirement under the laws of the Kingdom of Saudi Arabia. Failure to comply with HCIS regulations at facilities under HCIS jurisdiction may result in operation delays as HCIS approvals are a prerequisite for facility operation.

HCIS reserves the exclusive right to modify, add to, or amend, the Security, Safety & Fire Protection Directives without prior notice

نسخة غير معتمدة لشركة المياه الوطنية

نسخة مرخصة لـ شركة المياه الوطنية

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LIST OF SAFETY AND FIRE PROTECTION (SAF) DIRECTIVES FOR LIGHT INDUSTRIAL AND NON-INDUSTRIAL FACILITIES

SAF#	***SAF TITLE***
SAF-101	*General Safety and Fire Protection Requirements*
SAF-102	*Managing Safety, Health and Environment*
SAF-103	*Buildings*
SAF-104	*Fire Protection Systems and Equipment*
SAF-105	*Combustible/Flammable Materials*
SAF-106	*Hazardous Materials*
SAF-107	*Water Treatment, Storage and Distribution Facilities*
SAF-108	*Trains, Trainways, Stations and Support Facilities*
SAF-109	*Research Facilities*

نسخة مرخصة لشركة المياه الوطنية

نسخة مرخصة لـ شركة المياه الوطنية

SAF-101

General Safety and Fire Protection Requirements

Version 1.0

Safety & Fire Protection Directives
For Light-Industrial & Non-industrial Facilities

2017

نسخة مرخصة لشركة المياه الوطنية

KINGDOM OF SAUDI ARABIA
MINISTRY OF INTERIOR
HIGH COMMISSION FOR INDUSTRIAL SECURITY

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SAF-101 General Safety and Fire Protection Requirements

Version History

Item	Description	Issue Date
1	Version 1.0	• 5 Rajab, 1438 • 2 April, 2017

نسخة مرخصة لشركة المياه الوطنية

نسخة مرخصة لشركة المياه الوطنية

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SAF-101 General Safety and Fire Protection Requirements

1. Purpose

The purpose of this directive is to provide general requirements for all Safety and Fire Protection Directives listed in Section 2 for light industrial or non-industrial facilities under the supervision of the High Commission for Industrial Security, Ministry of Interior.

2. Scope

#	*Title*
SAF-102	*Managing Safety, Health and Environment at Non-industrial facilities*
SAF-103	*Buildings for Non-industrial Facilities*
SAF-104	*Fire Protection Systems and Equipment for Non-industrial facilities*
SAF-105	*Combustible/Flammable Materials*
SAF-106	*Hazardous Materials*
SAF-107	*Water Treatment, Storage and Distribution Facilities*
SAF-108	*Trains, Trainways, Stations and Support Facilities*
SAF-109	*Research Facilities*

3. Acronyms

FO	Facility Operator: the owner, operator or lessee of a facility
FP	Fire Protection
HCIS	High Commission for Industrial Security
KSA	Kingdom of Saudi Arabia
SAF	Safety and Fire Protection
SEC	Security
Shall	Indicates a mandatory requirement

4. References

The latest versions of the references in each directive shall apply.

5. General

5.1. Application

5.1.1. The HCIS has the ultimate authority to administer the directives.

5.1.2. The HCIS Directives are applicable to all new facilities, the expansion of existing facilities, and upgrades.

5.1.3. The FO shall not start safety and fire protection related work until HCIS approval of the final design and equipment.

5.1.4. Any major design or installation changes after HCIS approval shall be submitted to HCIS for concurrence.

5.1.5. The FO shall correct any deficiency identified by HCIS surveys and reviews.

5.2. Conflicts and Deviations

5.2.1. Where implementation of a requirement is unsuitable or impractical, where other equivalent company or internationally recognized Standards and Codes are followed, or where any conflict exists between the Directives and other company Standards and Codes, the deviations shall be resolved by the General Secretariat of the HCIS.

5.2.2. Deviations from the requirements of the Directives shall be listed and submitted in a report of non-compliance, with justification and rationale for not following the requirement. The justification must provide an equal alternative to the requirement that is being deviated from. The approval shall be received from the General Secretariat of the HCIS prior to implementation. The documents (justification and approval) shall be retained by the company in its permanent engineering files.

5.2.3. The HCIS reserves the right to reject any non-compliant equipment, system, or suppliers. In case any equipment, system, or supplier is rejected by HCIS, the FO shall replace it with one that is approved or submit additional details for justification of approval.

5.3. Non-Disclosure Agreements

5.3.1. Companies involved in projects shall sign "Non-Disclosure Agreements" stating that no proprietary document will be disclosed to a third party without prior written approval from FO.

نسخة مرفقة لشركة الهيل الوطنية

6. Service Providers

6.1. General

6.1.1. All companies providing but not limited to general or specific engineering, procurement, and construction services at facilities supervised by HCIS shall comply with the applicable laws of the Kingdom of Saudi Arabia.

6.1.2. FO shall be responsible for due diligence in service provider selection.

6.2. FP Consultants

6.2.1. FP consultants shall be licensed and registered to perform consultancy in accordance with the applicable laws of the KSA.

6.2.2. FP consultants shall be professional engineers licensed in their respective countries.

6.2.3. FP consultants shall have no less than 5 years of fire protection engineering experience in the following duties:

a. Implementing building codes, NFPA standards, etc.
b. Fire Hazard Analysis
c. Development of Engineering Design Packages
d. Approval (stamp, sign and date) of Contractor's shop drawings for compliance with the codes, standards and bid documents
e. Troubleshooting during construction/installation
f. Participating in commissioning of the fire protection systems

6.3. FP Contractors

6.3.1. FP contractors shall be licensed and registered to supply, install, test, inspect and maintain specific fire protection systems (fire detection and alarm, special extinguishing systems and water based fire suppression systems) in accordance with the applicable laws and regulations of the KSA.

6.3.2. FP contractor's personnel shall have formal trade-relevant training.

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7. HCIS Reviews

7.1. Submission Documentation

FO shall submit to HCIS the following documentation.

SAF-101	A list of non-compliances, if any
SAF-102	Safety Management System
SAF-103	Building occupancy classifications Building code requirements Front-end engineering design package
SAF-104	FP systems installation drawings Detection and alarm cause & effect diagrams FP system calculations Specific FP equipment data sheets FP systems commissioning documentation
SAF-105 SAF-106 SAF-107 SAF-108	Documentation required in referenced non-industrial SAFs
SAF-109	As stated in SAF-109

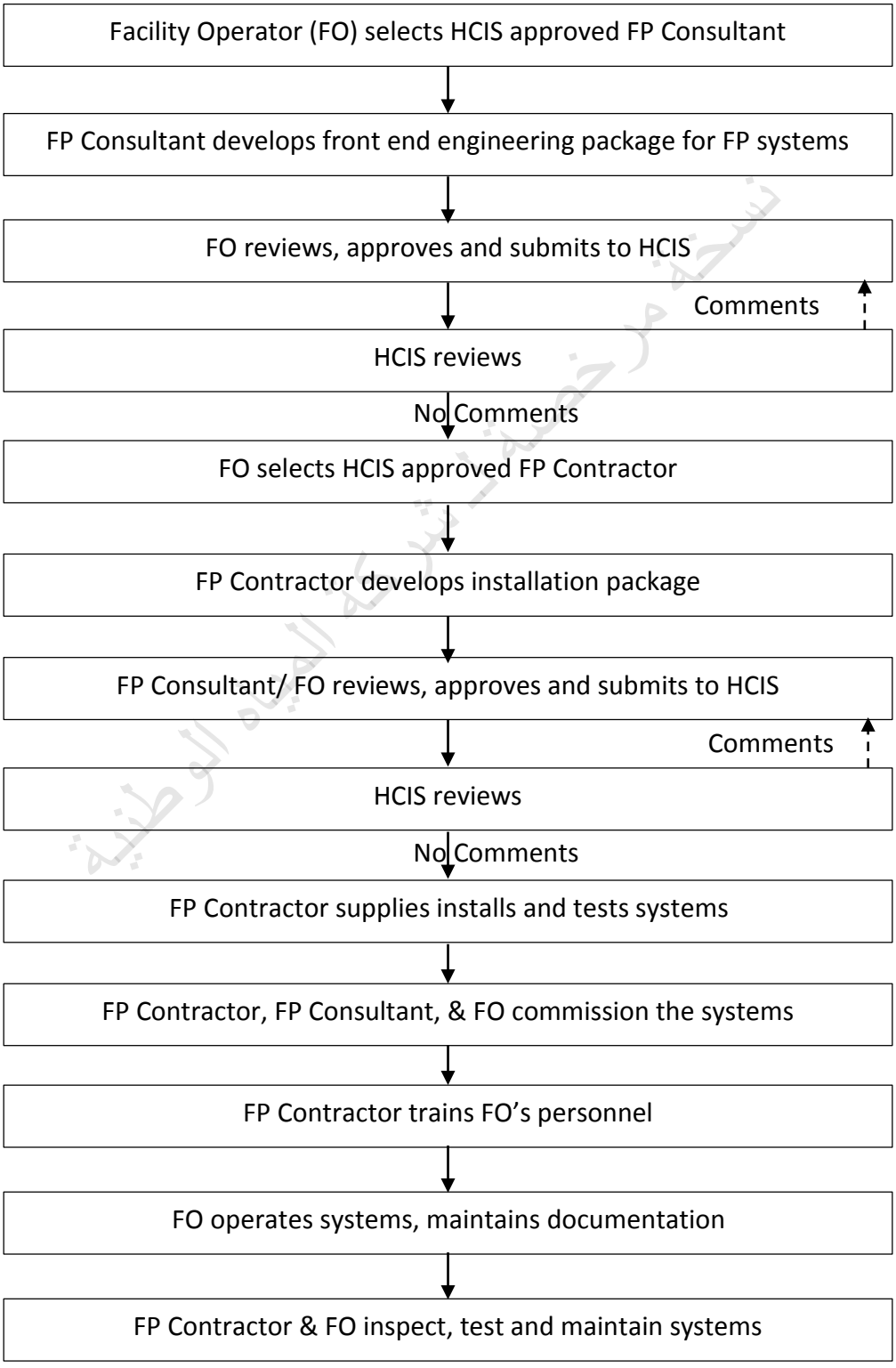
7.2. Submittals

7.2.1. All submissions to the HCIS shall be in writing.

7.2.2. All submissions shall be provided on a compact disk and in full size hard prints unless specifically requested by the HCIS otherwise.

نسخة مرخصة لـ شركة المياه الوطنية

8. Fire Protection Workflow


Facility Operator (FO) selects HCIS approved FP Consultant
FP Consultant develops front end engineering package for FP systems
FO reviews, approves and submits to HCIS
Comments
HCIS reviews
No Comments
FO selects HCIS approved FP Contractor
FP Contractor develops installation package
FP Consultant/ FO reviews, approves and submits to HCIS
Comments
HCIS reviews
No Comments
FP Contractor supplies installs and tests systems
FP Contractor, FP Consultant, & FO commission the systems
FP Contractor trains FO's personnel
FO operates systems, maintains documentation
FP Contractor & FO inspect, test and maintain systems

نسخة مرخصة لشركة المياه الوطنية

SAF-102

Managing Safety, Health and Environment

Version 1.0

Safety & Fire Protection Directives
For Non-Industrial Facilities

2017

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KINGDOM OF SAUDI ARABIA
MINISTRY OF INTERIOR
HIGH COMMISSION FOR INDUSTRIAL SECURITY

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1	Version 1.0	• 5 Rajab, 1438 • 2 April, 2017

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نسخة مرخصة لشركة المياه الوطنية

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نسخة مرخصة لشركة المياه الوطنية

1. Purpose

The purpose of this directive is to describe the minimum requirements of the High Commission for Industrial Security, Ministry of Interior for managing safety health and environment.

2. Scope

This directive applies to companies and establishments operating light industrial or non-industrial facilities under the supervision of the High Commission for Industrial Security, Ministry of Interior.

Facility operators shall also comply with the related requirements of the Saudi local or national agencies such as but not limited to Ministry of Labor, General Organization for Social Insurance GOSI and Ministry of Environment, and Water and Agriculture.

3. Acronyms

AHJ	Authority Having Jurisdiction
EHS	Environmental, Health and Safety
FO	Facility Operator
GOSI	General Organization for Social Insurance
HCIS	High Commission for Industrial Security
MOL	Ministry of Labor, KSA
PPE	Personal Protective Equipment

4. References

American National Standards Institute (ANSI)

ANSI Z10	Occupational Health and Safety Management Systems
ANSI Z400.1	Hazardous Industrial Chemicals - Material Safety Data Sheets….
ANSI/ISEA Z358.1	*Standard for Emergency Eyewash and Shower Equipment*
ANSI/ISEA Z89.1	*Standard for Industrial Head Protection*
ANSI/ISEA 105	*Standard for Hand Protection Selection Criteria*
ANSI/ISEA Z87.1	*Standard for ….. Personal Eye and Face Protection Devices*
ANSI/ISEA 103	*Standard for ……. Chemical Protective Clothing*
ANSI/ISEA 107	*Standard for High-Visibility Safety Apparel and Headwear.*
ANSI/CGA G-7.1	*Standard for Commodity Specification for Air*
ANSI/ASSE Z359	*Fall Protection Code*

American Society for Testing Materials (ASTM)

ASTM D120	*Standard Specification for Rubber Insulating Gloves*
ASTM F2412-11	*Standard Test Methods for Foot Protection*

National Fire Protection Association (NFPA)

NFPA 51B	*Welding Cutting, Other Hot Work*
NFPA 70E	*Electrical Safety in the Workplace*
NFPA 350	*Guide for Safe Confined Space Entry and Work*
NFPA 1851	*Standard on Selection, Care, and Maintenance of Protective Ensembles For Structural Fire Fighting and Proximity Fire Fighting*
NFPA 1981	*Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services*
NFPA 2112	*Standard on Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire*
NFPA 2113	*Standard on Selection, Care, Use, and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Short-Duration Thermal Exposures*

Safety and Fire Protection (SAF) Directives

SAF-101	*General Safety and Fire Protection Requirements*
SAF-102	*Managing Safety, Health and Environment*
SAF-103	*Buildings*
SAF-104	*Fire Protection Systems and Equipment*
SAF-105	*Combustible/Flammable Materials*
SAF-106	*Hazardous Materials*
SAF-107	*Water Treatment, Storage and Distribution Facilities*
SAF-108	*Trains, Trainways, Stations and Support Facilities*
SAF-109	*Research Centers*

General Organization for Social Insurance (GOSI), KSA

Social Insurance Law

Occupational Health and Safety Assessment Series (OHSAS)

OHSAS 18001 - The Occupational Health and Safety Management Systems

Ministry of Labor (MOL), KSA

Saudi Labor Law Part VIII, Protection against Occupational Hazards, Major Industrial Accidents and Work Injuries, and Health and Social Services. (Royal Decree No.M/51, 23 Sha'ban 1426/27 September 2005)

5. Safety Accountability

5.1. Facility Operator

5.1.1. FO shall be accountable for safety of the people, assets and environment under his care.

5.1.2. FOs shall put in place a safety program aligned with the unique risks at his facility.

5.1.3. Safety program shall include safety processes mentioned, but not limited to those mentioned herein.

5.1.4. Each safety process shall describe singular outcome; list who does what and when (time, frequency, duration, etc.); how to document what is done; and how to measure results.

5.2. Safety Responsibilities

5.2.1. FO shall communicate the following responsibilities to supervisory personnel:

a. Identify and communicate the safety rules to all.
b. Provide effective technical and safety training.
c. Conduct regular safety meetings.
d. Conduct regular tours and correct unsafe acts and conditions.
e. Prepare for emergencies.
f. Investigate injuries and incidents and take corrective actions.
g. Review safety performance of unit and its personnel and improve.

5.2.2. FO shall communicate the following responsibilities to all personnel:

a. Comply with the safety rules.
b. Operate, inspect, and maintain facilities in safe condition.
c. Participate in regular safety meetings.
d. Know emergency actions.
e. Report unsafe conditions and actions, injuries and incidents.
f. Assist with investigations of incidents involved.

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5.2.3. FO shall communicate the following responsibilities to all companies providing service at the facility:

a. Provide personnel skilled in their craft.
b. Provide proper tools, resources and PPE to personnel.
c. Train personnel in the safety rules of the facility.
d. Ensure personnel follows all safety rules.
e. Do not work or operate equipment without FO's permission.
f. Have a safety meeting before starting any work.
g. Report unsafe conditions and actions, injuries and incidents.
h. Assist with investigations of incidents involved.

6. Risk Management

6.1. Risk Assessment

6.1.1. The facilities shall be located, designed, constructed, operated and maintained in a manner not to pose intolerable risk to people, assets and environment due to hazards unique to the facility.

6.1.2. Tolerability criteria of the relevant AHJ shall be met.

6.1.3. Any modification to existing facilities shall be subjected to risk assessment.

6.2. Hazard Control

6.2.1. Engineering controls such as separating the hazard from exposed by distance, barrier, and protective systems shall be considered as the first line of defense.

6.2.2. Administrative controls such as safe operation procedures for activities with potential to harm people, property and environment shall be utilized as the second line of defense. These include but are not limited to hot work permit, confined space entry permit, excavation permit, etc.

6.2.3. Use of PPE shall be considered as the third line of defense for personnel protection against the residual risks. PPE shall comply with the relevant standards listed in Section 4.

7. Communications

FO shall communicate hazards, risks and the associated rules to follow and actions to take to personnel, visitors, contractors and community.

8. Training

FO shall train its personnel on the technical skills required to operate facilities, stationary equipment and motorized equipment; on the facility's safety program and on the individual responsibilities in the safety processes.

9. Asset Integrity

9.1. Design and Engineering

9.1.1. FO shall select companies having the relevant know-how and demonstrable experience in design and engineering of the desired facilities.

9.1.2. The design and engineering companies shall meet the requirements of SAF-101.

9.2. Construction

9.2.1. FO shall select companies having the relevant know-how and demonstrable experience in the construction of the desired facilities.

9.2.2. The construction/installation companies shall meet the requirements of SAF-101.

9.3. Operation and Maintenance

9.3.1. FO shall develop Safe Operating Procedures for using the equipment.

9.3.2. FO shall develop and implement the following processes as a minimum:

a. Equipment inspections.
b. Building inspections.
c. Vehicle inspections.
d. Preventive maintenance.
e. Reactive maintenance.

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10. Safe Operations

10.1. Hazardous Work

FO shall identify and control hazardous activities. The following activities are examples:

10.1.1. Hot Work

a. Refer to NFPA 51 B for hot work.
b. Hot work is any activity that may generate sufficient heat to cause ignition. Examples include:
   - Open flame work such as torch cutting
   - Welding and allied processes
c. FOs shall have the following provisions in place for hot work:
   - Barriers around flame cutting, welding and allied processes
   - Removal/coverage of material that can ignite
   - Firefighting equipment
   - Fire watch during and after work

10.1.2. Confined Space Entry

a. Comply with NFPA 350.
b. Only trained and authorized personnel to enter confined spaces.
c. All required isolation shall be completed (See Section 10.3).
d. Confined space shall be prepared for safe work and evacuation.
e. Confined space shall be monitored during work.
f. Entrants shall sign a log in/out sheet when they enter/exit.

10.1.3. Excavation and Trenching

a. Before excavation activities begin, the following factors shall be evaluated by a qualified person:
   - Soil classification
   - Design (location, depth and width, underground obstructions, sources soil vibrations, surrounding structures, cave-in protection, etc.)
   - Selection of appropriate method of excavation and soil removal (e.g. manual excavation, machine excavation, both)
   - Location and types of barricades, signs, and lighting
   - Means of entry and exit
   - Protective systems to be used (i.e., benching, sloping, shoring)

b. Excavation machines, spoil piles, scaffold bases, personnel and vehicular traffic shall be kept at a safe distance from the excavation.
c. Personnel shall not be in the excavation during mechanical excavation
d. Guard rails and barricades shall be in place to prevent unauthorized access
e. Warning lights shall be used to mark the excavation if people or vehicles are likely to be present in the vicinity after dark.
f. Utilities shall be properly braced or shored to prevent undermining the services.
g. Proper access/egress to/from excavation shall be provided.
h. Excavations deeper than 1.2m (4 ft) shall be considered confined space.

10.1.4. Electrical Work

a. Electrical work shall be carried out in accordance with NFPA-70E.
b. Electrical work shall be carried out by properly equipped personnel who are trained and certified.
c. Only properly equipped personnel who are trained and certified shall be allowed to work on electrical equipment or be present within minimum clearance of electrical equipment.
d. Electrical work shall be carried out after electrical equipment is isolated as per Section 10.3.
e. Energized Electrical Work shall be permitted only when a circuit or equipment cannot justifiably be de-energized or the work deferred until the next scheduled outage.

10.1.5. Work at Heights

a. FOs and contractors shall comply with ANSI Z359 or equivalent international standards for fall protection.
b. Each person who could fall more than 1.8 m (6 ft.) shall be protected by a fall protection system.
c. Fall protection systems include fixed fall protection system (such as scaffolding) and personal fall arrest systems. Fixed fall system shall be preferred where feasible.
d. Motorized equipment such as a scissor lift or similar equipment shall be used in accordance with manufacturer's instructions.

10.1.6. Work with Chemicals

a. FO shall label containers of chemicals and communicate the associated hazards and protection to concerned employees.
b. FO shall safely dispose of the unlabeled containers with unknown contents.
c. FO shall establish and implement safe chemical handling procedures among their employees and the contractors.
d. FOs shall monitor toxic materials and provide personal protection as needed.
e. PPE, including appropriate respiratory protection equipment shall be used when working with chemicals and hazardous substances.
f. Chemical storage and handling areas shall have safety shower/eyewash as per ANSI/ISEA Z358.1 or equivalent international standards.

10.2. Control of Hazardous Work by Work Permits

10.2.1. As a minimum hot work, confined space entry, opening line &equipment in hazardous service and live electrical work shall be subject to work permitting.

10.2.2. Hot work done at locations (e.g. shops, fabrication yards, etc.) that are specifically configured and equipped for executing hot work safely are exempt from hot work permit requirement.

10.2.3. FOs may require permit to work for other types of hazardous work in specific work locations and/or specific types of activities based on the hazards that are present.

10.2.4. FO shall ensure work permit issuers and receivers have sufficient training knowledge and experience, and are capable of recognizing hazards prior to authorizing them to sign work permits.

10.2.5. Work permits shall document the specific location/equipment, reason for and the nature of the work; the date, time and expected duration of the work; any necessary measures to control identified hazards, and signatures of the issuers and receivers.

10.2.6. No work permit shall be issued before work location is made safe for work as follows:

a. Energized equipment isolated; residual hazards are removed.
b. Atmosphere tested to ensure no hazardous gas/vapor exists.
c. Safe working platforms provided.
d. Barricades/barriers/signs provided to prevent unauthorized personnel from entering the work area.
e. Safe Access/ Egress to/from work location provided and actions to take in an emergency identified.
f. Work location is visited jointly by issuer and receiver and verified to be safe to start work.

10.2.7. Work permit copies shall be maintained for at least 3 months.

10.3. Isolation of Hazardous Energy

10.3.1. Sources of electrical, mechanical, hydraulic, and pneumatic energy for powered equipment shall be isolated and isolation devices shall be locked & tagged; the equipment shall be cleared of hazardous energy, people & tools; and tested to verify successful isolation LOCK, (i.e.,TAG, CLEAR and TRY) before any work is permitted on such equipment.

10.3.2. Blinding or disconnection are the only acceptable isolation methods for entries into confined spaces.

10.3.3. Locking and isolation devices shall be appropriate for the involved equipment.

10.3.4. Workers shall be afforded individual protection (personal lock with a single key that remains in his in possession) while working on isolated, locked and tagged equipment.

10.3.5. For equipment with multiple isolation points, FO shall develop specific written isolation procedures indicating:

a. Equipment name and number.
b. LOTO positions/Locations of disconnects.
c. Energy Sources (electrical, mechanical, hydraulic, pneumatic).
d. Method of lockout; isolation and blinding equipment/devices.
e. Removal of hazardous energy.

11. Emergency Preparedness

Facility Operator shall develop and implement the following processes, plans and programs for Emergency Preparedness.

11.1. Emergency Planning

11.1.1. FO shall designate an Emergency Response Coordinator and charter an Emergency Planning Team to develop and administer an Emergency Preparedness Program. The team shall also update emergency response plan periodically to reflect the areas of improvement identified through drills.

11.1.2. The Emergency Planning Team shall be comprised of personnel with experience in emergencies, operations, maintenance and engineering, fire, safety, security, medical, communications and information technology. The team may also include subject matter experts as well as mutual aid partner representatives, as necessary.

11.1.3. Emergency Response Coordinator shall lead the team.

11.2. Emergency Risks Assessment

11.2.1. Emergency Planning Team shall. Identify credible facility-specific emergency scenarios as per the risks identified. They may include but are not limited to:

- Chemical, biological, radioactive material releases
- Fires and explosions
- Structural collapse
- Medical Emergencies
- Power loss
- Natural disasters
- Security Incidents including but not limited to active shooters, improvised explosive devices, etc.

11.3. Emergency Capability Assessment

Emergency Planning Team shall determine the internal and external resources (e.g. Civil Defense) needed for response and ensure they are available whenever they are needed.

11.4. Emergency Response Plan Development

11.4.1. Emergency Planning Team shall develop a Facility Emergency Response Plan that addresses:

a. Credible scenarios.
b. The following tactical priorities (the order may change based on the nature of the incident):
   - Rescue of and care for injured
   - Control incident
   - Protect property and environment
   - Manage risks to the responders

11.5. Emergency Training

11.5.1. The Emergency Planning Team shall develop a schedule for training all applicable personnel on the emergency response plan and monitor its implementation.

11.5.2. The following training topics shall be considered, as applicable:

Topic#	Description
1	Emergency Reporting Procedures
2	Initial Emergency Response Actions
3	Use of Fire Extinguishers
4	First Aid & Life Support
5	Use of Self-Contained Breathing Apparatus
6	Incident Command Procedures
7	Hazardous Material Response Procedure
8	Emergency Radio use protocol
9	Fire and Rescue

11.5.3. The participants shall be as follows as a minimum:

Participants	Topics
All personnel	1,2
All operations personnel	1,2,3,4,5
Emergency Response Team Members	1,2,3,4,5,6,7,8,9

11.6. Validation of Emergency Capability

The Emergency Planning Team shall develop an annual schedule for drills and exercises and monitor its implementation. All drill plans shall be reviewed for safety. The lessons learned and corrective actions identified during drills shall be recorded and tracked until completion.

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11.7. Improvement of Emergency Response Plan

Emergency Planning Team shall regularly review and update the overall emergency preparedness program including the emergency response plan and emergency response training to reflect the area of improvements identified through drills and critiques.

11.8. Exhibit: A Sample Facility Emergency Response Plan Structure

1. Purpose
2. Emergency Organization
   a. Emergency roles
   b. Emergency responsibilities
3. Emergency Notifications
   a. How to notify personnel?
   b. How to notify management?
   c. How to notify communities?
   d. How to notify authorities?
4. Emergency Communications
   a. Means of communication
   b. Call-out
   c. Radio use protocol
   d. Communication Protocol with third parties and media
5. Standard Emergency Procedures
   a. For non-emergency personnel
      - How to report emergencies?
      - How to respond to emergencies?
      - How to evacuate buildings?
      - How to evacuate the plant?
      - How to respond to vehicle fires?
      - How to respond to hostile acts?
      - How to respond to bomb threat?
   b. For Emergency Personnel (Incident Command Procedures)
      - How to establish an Incident Command Post?
      - How to establish communications?
      - How to conduct size-up?
      - How to transfer Incident Command?
      - How to expand response?
      - How to evacuate and control incident scene?
      - How to account for people?

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- How to develop a response strategy?
- How to execute tactical actions?
- How to terminate response?
- How to recover and restore?

6. Emergency Action Plans
   - How to deal with specific incidents such as but not limited to hazardous material release?
   - Responding organization (fire, security, medical, etc.) may need to develop specific tactical response plans that support the Emergency Action Plans. These tactical response plans identify in detail the steps of individual organizations will take to fulfil their responsibilities as described in the emergency action plan.

APPENDIX

A. Facility Map
B. Radio Use Groups
C. Call-out list
D. Other supplements

12. Reporting and Investigation of Injuries and Incidents

12.1. Classifications

12.1.1. Occupational Injuries shall be classified in accordance with GOSI Regulations for Implementation of the Social Insurance Law.

12.1.2. An injury shall be deemed a work injury in accordance with the provisions of the Social Insurance Law.

12.1.3. Occupational diseases shall also be considered work injuries and the date of the first medical diagnosis of the disease shall be considered to be the date of injury.

12.1.4. Incidents without any injury, major asset damage, or harm to the environment shall be considered as Minor Incidents.

12.1.5. An incident that damages fixed or mobile assets but causes no harm to people shall be considered as an asset loss incident.

12.1.6. An incident resulting in one of the following consequences shall be considered Major Incident:

a. Permanent disability, and fatality among personnel.
b. Potential for harm to marine life or wild life.
c. Interruption to services for a period greater than 8 hours.
d. Losses estimated to be in excess of 1,000,000 SAR.

12.2. Reporting

12.2.1. All incidents, no matter how small, shall be reported.

12.2.2. All major incidents as defined herein and security incidents shall be reported to HCIS in writing within 24 hours.

12.3. Investigations

12.3.1. All incidents shall be investigated by using methods appropriate for the nature and the severity of the incident to prevent recurrence by communicating lessons learned and taking corrective actions.

12.3.2. All security incidents shall be investigated jointly by the security officials of the facility and the authorities having jurisdiction including but not limited to HCIS. The Investigation report shall be submitted to HCIS in writing upon completion.

12.3.3. Minor incidents involving releases and fires shall be investigated and the lessons learned be communicated to personnel by the line managers responsible for the affected area.

12.3.4. Asset loss incidents shall be investigated by a competent team from the facility; investigation shall be documented, lessons learned shall be communicated to personnel. The investigation report shall be made available to HCIS when requested.

12.3.5. Major incidents shall be investigated by a team led by an individual who does not have a conflict of interest with the investigation report's conclusion. The team shall include management, employees and experts on subject matters that are relevant to the incident. The team leader shall have experience in incident investigations techniques and causal analysis. The Investigation Team shall:

a. Secure the incident area and preserve evidence.
b. Collect data.
c. Analyze data.

d. Draw conclusions.
e. Identify corrective actions.
f. Write the report with the following sections as a minimum:

Cover page (with CONFIDENTIAL stamp)
Executive Summary (one page)
The formal charter of investigation team
Names and Signatures page
Table of contents

1. Facts
   - Background information
   - Damage assessment
   - Chronological facts
   - Relevant photos, figures, etc.
2. Analysis
   - Analysis narrative
   - Events and Causal Factors Chart
   - Other analytical representations if any
3. Systemic Factors (Root Causes)
4. Corrective Actions (Specific, Measurable, Achievable, Relevant and Time –bound)
5. Conclusions
6. Appendices – Documents/Data referenced in the report.

12.3.6. FO shall submit the report to HCIS for review and approval.

12.3.7. FO shall take corrective actions to prevent recurrence.

12.3.8. FO shall communicate lessons learned to personnel.

نسخة من الأصل لدى الهيئة العليا للأمن الصناعي

نسخة مرخصة لشركة المياه الوطنية

SAF-103
Buildings

Version 1.0

Safety & Fire Protection Directives
For Light Industrial & Non-industrial Facilities

2017

نسخة مرخصة لشركة المياه الوطنية

KINGDOM OF SAUDI ARABIA
MINISTRY OF INTERIOR
HIGH COMMISSION FOR INDUSTRIAL SECURITY

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نسخة مرخصة لـ شركة المياه الوطنية

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نسخة مرخصة لشركة المياه الوطنية

نسخة مرخصة لشركة المياه الوطنية

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نسخة مرخصة لشركة المياه الوطنية

نسخة مرخصة لشركة المياه الوطنية

SAF-103 Buildings

1. Purpose

The purpose of this Safety (SAF) directive is to provide the minimum requirements for the protection of buildings and their occupants against fires and other safety hazards.

2. Scope

This directive applies to buildings for light industrial or non-industrial facilities that are under the supervision of HCIS.

3. Acronyms

FO Facility Operator
HVAC Heating, Ventilating, and Air Conditioning

For definitions, refer to the references in Section 4.

4. References

American Society for Testing and Materials (ASTM)
ASTM E-108 *Standard Test Methods for Fire Tests of Roof Coverings*
ASTM E-119 *Standard Test Methods for Fire Tests of Building Construction &Mat.*
Building and Fire Codes
Saudi Building Code (SBC)
International Fire Code (IFC)
Factory Mutual (FM) Global
FM Data Sheet 1-6 *Cooling Towers*
Institute of Electrical and Electronics Engineers, Inc. (IEEE)
IEEE 484 *EEE Recommended Practice for Installation Design and Installation of Vented Lead-Acid Batteries for Stationary Applications*
National Fire Protection Association (NFPA)
NFPA 10 *Standard for Portable Fire Extinguishers*
NFPA 30 *Flammable and Combustible Liquids Code*
NFPA 45 *Standard on Fire Protection for Laboratories Using Chemicals*
NFPA 75 *Standard for the Fire Protection of Information Technology Equipment*
NFPA 76 *Standard for the Fire Protection of Telecommunications Facilities*
NFPA 80 *Standard for Fire Doors and Other Opening Protectives*
NFPA 90A *Standard for the Installation of Air-Conditioning and Ventilating Systems*
NFPA 90B *Standard for the Installation of Warm Air Heating and Air-Conditioning*

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NFPA 220 *Standard on Types of Building Construction*
NFPA 251 *Standard Methods of Tests of Fire Resistance of Building Construction and Materials*
NFPA 252 *Standard Methods of Fire Tests of Door Assemblies*
NFPA 253 *Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source*
NFPA 259 *Standard Test Method for Potential Heat of Building Materials*

Underwriters Laboratories (UL)

UL 790 *Standard Test Methods for Fire Tests of Roof Coverings*
UL 1479 *Standard for Fire Tests of Through-Penetration Firestops*

Safety and Fire Protection Directives (SAF) for Non-Industrial Facilities

SAF-101 *General Safety and Fire Protection Requirements*
SAF-102 *Managing Safety, Health and Environment*
SAF-103 *Buildings*
SAF-104 *Fire Protection Systems and Equipment*
SAF-105 *Combustible/Flammable Materials*
SAF-106 *Hazardous Materials*
SAF-107 *Water Treatment, Storage and Distribution Facilities*
SAF-108 *Trains, Trainways, Stations and Support Facilities*
SAF-109 *Research Facilities*

5. Design and Construction

5.1. Fire Resistance

5.1.1. Buildings shall be constructed of noncombustible materials as per ASTM-119 and NFPA 80 A, NFPA 220, 251, 252, 253, and 259.

5.1.2. Roof covering shall be Class A in accordance with ASTM E 108.

5.2. Fire Prevention and Protection

5.2.1. All buildings shall be covered by external hoses in accordance with the references listed in Section 4

5.2.2. Design and installation of fire protection systems shall comply with SAF-104 and its references.

5.2.3. Fire doors and other openings shall comply with NFPA-80.

5.2.4. All penetrations at the walls, floors, decks shall be sealed by fire stops as per UL 1479.

5.2.5. The selection of extinguishing agents shall take into account the type of fire hazard, their impact on equipment and health hazards they pose.

5.2.6. Manual fire alarm devices (e.g., pull boxes) shall be installed in occupied buildings in accordance with the Saudi Building Code.

5.2.7. Automatic suppression systems shall be selected to be consistent with the fire hazards as follows:

a. Class A (ordinary combustibles) hazards shall be protected by automatic sprinkler systems.
b. Class B (ignitable liquids) hazards shall be protected by automatic foam water sprinkler systems or foam-water deluge systems.
c. Class A, B, and Class C (electrical equipment) hazards shall be protected by clean agent systems if water is not compatible with the hazard or water damage is not acceptable to FO.

5.2.8. Fixed full flood carbon dioxide systems shall be limited to spaces that do not allow full body entry and where fire hazard consist of Class-B (e.g., lube oil) or Class-C fires involving electrical equipment.

5.2.9. Portable Fire Extinguishers shall be provided as per NFPA-10 and as follows:

a. Locations such as offices, classrooms, and assembly halls that contain mainly ordinary combustible materials shall be provided Class-A extinguishers.
b. Locations where flammable liquids where ignitable liquids are stored, handled and used shall be provided with Class-B extinguishers.
c. Locations containing energized electrical equipment shall be provided with Class C extinguishers.
d. Locations where combustible metal powders, flakes, shavings, or similarly sized materials are generated shall be provided with Class D extinguishers.

e. Locations where combustible oils may reach their flash points (such as kitchens) shall be provided with Class-K extinguishers.
f. Where Class A, or B, or C extinguishers are required, multi-purpose extinguishers (e.g. Class ABC) may be used.

5.2.10. Rooms and areas housing Information technology equipment shall comply with NFPA 75 and NFPA 76 as applicable.

5.2.11. Buildings, rooms, enclosures containing electrical/electronic equipment and cabling shall be protected by smoke detection and alarm system.

5.2.12. In sprinklered buildings rooms, enclosures containing electrical/electronic equipment and cabling may be covered by extending the sprinkler system with an individual supervised control valve and flow switch.

5.2.13. Clean gas suppression system other than carbon dioxide may be provided at the discretion of FO.

5.2.14. Automatic suppression systems may be omitted in electrical rooms housing dry transformers.

5.2.15. Battery rooms shall comply with ANSI/IEEE 484 and be ventilated to limit the concentration of accumulated hydrogen to 1 percent by volume

5.2.16. Laboratories shall comply with NFPA-45; and be protected by fire alarm systems as well as automatic sprinkler systems.

5.2.17. Cafeteria/Restaurant cooking equipment installations shall be protected by wet chemical extinguishing systems.

5.2.18. Cooling towers shall be protected by water spray systems in accordance with FM-Data Sheet 1-6 if they are of combustible construction or contains combustible fillers.

5.3. <u>HVAC and Ventilation</u>

5.3.1. Refer to NFPA 90A or NFPA 90B for HVAC systems.

5.3.2. Refer to NFPA 30 for ventilation.

5.3.3. Enclosed spaces with hazardous atmospheres shall be ventilated:

a. Such systems shall be independent of building's HVAC systems.
b. Contaminated air shall be picked up from spaces where accumulation is likely and be exhausted in a manner to prevent harm to people after scrubbing if necessary.
c. In laboratories, systems featuring fume hoods shall be used.

5.3.4. Fire dampers compatible with the rating of the barrier shall be provided at the duct penetrations in accordance with NFPA 90A to the fire area unless the duct is protected throughout its length by a fire barrier equal to the rating required of fire barrier(s) penetrated.

5.3.5. Buildings in hazardous areas shall be designed to have a pressurized environment to preclude the entry of hazardous gases, vapors or smoke.

5.3.6. Heating, ventilation and air conditioning systems shall be designed to prevent propagation of smoke, fire and toxic gas/vapors throughout the building.

5.4. Drainage and Containment

5.4.1. Buildings shall be designed and constructed to prevent oil spills or burning liquids from spreading to the rest of the building (e.g. depressed floor, curbs and gutters, floor drains and drain traps, etc.) in accordance to SBC and IFC, and NFPA-30.

5.4.2. Hazardous materials shall not be connected sanitary sewer system and have their own closed drainage and disposal system.

نسخة مرخصة لشركة المياه الوطنية

SAF-104

Fire Protection Systems and Equipment

Version-1

Safety & Fire Protection Directives
For Light Industrial and Non-Industrial Facilities

2017

نسخة مرخصة لـ شركة المياه الوطنية

KINGDOM OF SAUDI ARABIA
MINISTRY OF INTERIOR
HIGH COMMISSION FOR INDUSTRIAL SECURITY

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SAF-104 Fire Protection Systems and Equipment

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نسخة مرخصة لشركة المياه الوطنية

SAF-104 Fire Protection Systems and Equipment

1. Purpose

The purpose of this directive is to specify the design and engineering requirements for the fire protection systems and equipment.

2. Scope

This directive applies to fire safety systems required by the SAF-Directives listed under Section 4 to prevent fire ignition and to manage fire impact (See NFPA-550).

3. Acronyms

FO: Facility Operator
For definitions refer to the references listed under Section 4.

4. References

American Water Works Association (AWWA)

Standard C503	*Wet-Barrel Fire Hydrants*
Standard C502	*Dry-Barrel Fire Hydrants*

Building and Fire Codes

Saudi Building Code (SBC)

International Fire Code (IFC)

Environmental Protection Agency (EPA):

Guidance for the EPA Halon Emission Reduction Rule: 40CFR, Part 82, Subpart H

Factory Mutual (FM) Global

Data Sheet 2-0	Installation Guidelines for Automatic Sprinklers
Data Sheet 3-11	Pressure Reducing Valves
Data Sheet 3-26	Fire Protection Water Demand for Non-storage Sprinklered Properties
Data Sheet 8-9	Storage of Class 1, 2, 3, 4 and Plastic Commodities

National Fire Protection Association (NFPA)[1]

NFPA 10	*Standard for Portable Fire Extinguishers*
NFPA 12	*Standard on Carbon Dioxide Extinguishing Systems*
NFPA 13	*Standard for the Installation of Sprinkler Systems*
NFPA 14	*Standard for the Installation of Standpipe and Hose Systems*
NFPA 15	*Standard for Water Spray Fixed Systems for Fire Protection*

[1] The NFPA standards not referenced shall be complied with when they are relevant.

NFPA 16	*Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems*
NFPA 17	*Standard for Dry Chemical Extinguishing Systems*
NFPA 17A	*Standard for Wet Chemical Extinguishing Systems*
NFPA 20	*Standard for the Installation of Stationary Pumps for Fire Prot.*
NFPA 22	*Standard for Water Tanks for Private Fire Protection*
NFPA 24	*Standard for the Installation of Private Fire Service Mains and Their Appurtenances*
NFPA 25	*Standard for the Testing, Inspection and Maintenance of Water Based Fire Protection Systems*
NFPA 30	*Flammable and Combustible Liquids Code*
NFPA 70	*National Electrical Code*
NFPA 72	*National Fire Alarm and Signaling Code*
NFPA 550	*Guide to Fire Safety Concepts Tree*
NFPA 2001	*Standard on Clean Agent Fire Extinguishing Systems*

Safety and Fire Protection Directives for Non-industrial Facilities

SAF-101	*General Safety and Fire Protection Requirements*
SAF-102	*Managing Safety, Health and Environment*
SAF-103	*Buildings*
SAF-104	*Fire Protection Systems and Equipment*
SAF-105	*Combustible/Flammable Materials*
SAF-106	*Hazardous Materials*
SAF-107	*Water Treatment, Storage and Distribution Facilities*
SAF-108	*Trains, Trainways, Stations and Support Facilities*
SAF-109	*Research Facilities*

5. General

5.1. Engineering Design

5.1.1. Engineering design shall be done by fire protection engineering consultants qualified as per SAF-101.

5.2. Installation, Testing, Inspection & Maintenance

5.2.1. Installation and acceptance testing shall be done by fire protection contractors qualified as per SAF-101.

5.2.2. After commissioning, testing, inspection, and maintenance shall be done by FO's qualified personnel or fire protection contractors qualified as per SAF-101.

5.2.3. Testing, inspection and maintenance of water based fire protection systems shall be as per NFPA-25 and as per the relevant standard for other systems.

5.3. Listing and Approval

5.3.1. All fire protection equipment shall comply with the standards of Underwriters Laboratories (UL) or FM or other internationally recognized testing and inspection agencies.

5.3.2. Jockey pumps are not required to be listed/approved for fire service.

5.3.3. Fire water system components shall be listed or approved for not less than 12 Bars (175 psig).

6. Systems and Equipment for Preventing Ignition

6.1. Control heat energy sources

6.1.1. FOs shall provide properly segregated enclosures designed for smoking, heat generating appliances, open flame generating equipment and prohibit such activities outside these enclosures.

6.2. Control heat energy source and fuel interactions

6.2.1. FO shall utilize electrical equipment that is classified for the specific combustible/flammable atmospheres, if any, in their facilities.

6.2.2. Maintenance operations involving heat generating equipment such as but not limited to welding in areas where combustibles/flammables exist shall be controlled by a work permit process.

6.3. Fuel Control

6.3.1. Equipment containing hazardous material inventory shall have emergency shutdown system.

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6.3.2. Equipment containing hazardous material inventory shall have secondary containment to prevent spread any release.

6.3.3. Ventilation/Exhaust

a. The ventilation systems shall comply with NFPA 30
b. Building pressurization systems shall comply with NFPA 496
c. Contaminated air shall be picked up from spaces where accumulation is likely.

7. Systems and Equipment for Managing Fire Impact

7.1. Fire Alarm Signaling Systems

7.1.1. The systems shall be designed and installed in compliance with NFPA-72 and 70.

7.1.2. The systems shall feature the following:

a. Addressable detectors
b. Multiplexed system
c. Proprietary supervised system (all signals, supervisory, trouble or fire alarm, shall be sent to central control equipment manned by the FO)
d. Ability to interface with Distributed Control Systems.

7.1.3. Spot type detectors shall not be used at high ceilings/roof decks where smoke may not reach due to the potential of stratification. Beam detectors shall be used for this condition.

7.1.4. Fire detection and automatic fixed fire suppression systems shall be equipped with local audible and visual signals with annunciation in a constantly attended location designed to monitor such signals.

7.1.5. Alarm signals shall be designed to be audible and visual at locations with background noise

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7.2. Fire Water Supply and Reserves

7.2.1. Fire water shall be fresh water.

7.2.2. Fire water tank(s) shall comply with NFPA-22.

7.2.3. Fire water reserves' effective capacity shall be sufficient to supply water at full design delivery rate for 2 hours unless otherwise indicated by fire risk assessment and the design basis.

7.2.4. Tank(s) shall be equipped with a make-up system.

7.2.5. If a water tank that serves non-fire systems is used for fire system, suction arrangement shall not allow non-fire systems to use required fire water reserve.

7.2.6. Maximum system pressure shall not exceed 12 Bars (175 psig) (See Section 8.1) at any point and any time except for risers in tall buildings.

7.3. Fire Pump Stations

7.3.1. Fire pumps shall not be installed in below-grade pump rooms.

7.3.2. New fire pumps shall be packaged sets to eliminate design and installation errors unless the overall size makes transportation and handling prohibitive.

7.3.3. Fire pump systems shall comply with NFPA-20 and also meet the following requirements:

a. Fire pumps shall be vertical turbine type when the water reservoir is below-the fire pumps.
b. Fire pump system shall have 100% redundancy with respect to the highest fire water demand.
   - Two electrical motor driven fire pumps shall not be considered redundant unless fed from a separate bus bar.
c. Where there is a reliable power supply, the primary fire pump shall be electrical motor driven and the redundant fire pumps shall be diesel engine driven type.

d. Where power supply is not adequate all pumps may be diesel engine driven
e. Shutoff pressure of a fire pump shall comply with Section- 8.1.
f. Fire pumps shall be started automatically and sequentially by pressure drop sensed by the pressure sensors in their controllers as shown in NFPA-20.
g. Fire pump shall be stopped manually. Auto stop by the action of timers shall not be allowed.
h. Power to the electrical motor driven fire pump shall be supplied via a protected feeder dedicated to the fire pump motor.
i. Motor starters shall be direct-on-line type.

7.3.4. Pressure Maintenance

a. System pressure shall be maintained by jockey pumps.
b. Shutoff pressure of a jockey pump shall not be less than that of the fire pump but never more than "12 bars (175 psig) - maximum suction head".

7.4. <u>Private Fire Water Mains</u>

7.4.1. Fire water network shall comply with NFPA-24 and the requirements herein:

7.4.2. Water supply and fire protection systems shall be designed without pressure control or regulation valves as per NFPA-24.

7.4.3. Buried Underground piping

a. Non-metallic piping shall be of a type approved by an independent testing agency such as Factory Mutual or equivalent.
b. Thrust blocks are not required for piping with joints that are manufacturer-certified to be self-restraining type capable of maintaining its integrity without thrust blocks.
c. Manufacturers' installation recommendations shall be followed.
d. Risers to hydrants shall be metallic material with an engineered transition fitting at the non-metallic underground piping.

7.4.4. Buried valves for firewater system mains and branch piping shall be post indicator type. Identification shall be provided at each valve to indicate its function and what end devices it controls.

7.4.5. Fire water distribution piping shall have loops with strategically located sectional block valves to facilitate isolation of piping sections as follows:

a. A combination of no more than five resources, such as hydrants, , water spray systems, etc. shall be out-of-service at any given time.
b. Sectional block valves shall be provided at no more than 243 m (800 ft.) intervals for long runs of pipe.

7.4.6. All fire protection water supply and system control valves shall be under a periodic inspection program and shall be supervised

7.5. Water Based Suppression Systems and Equipment

7.5.1. Fire Hydrants

a. Fire hydrants shall be UL-Listed/FM-Approved wet-barrel type complying with AWWA Standard C503.
b. Fire hydrants shall be UL-Listed/FM-Approved dry-barrel type complying with AWWA Standard C502 at location where temperatures might fall to freezing temperatures.
c. Hydrant inlets and the connection piping shall not be less than 152 millimeters (6-inch).
d. Hydrant hose connections shall be compatible with the fire truck equipment.
e. Hydrants shall be so located to allow easy connection to the pumper truck.
f. Hydrants accessible to fire trucks shall be equipped with pumper connections compatible with fire department vehicles. The pumper connection shall face the roadway.
g. Fire hydrants and connections shall be unobstructed, clearly marked, located within 6 meters of roads or access ways suitable for access by a fire truck.

7.5.2. Automatic Sprinkler Systems shall comply with NFPA-13 and the following requirements:

a. Systems shall be sized hydraulically (pipe schedule method is not permitted). A data plate with the hydraulic calculation data shall be attached to the system control valve assembly.
b. Supply and demand shall be plotted on a $N^{1.85}$ graph (See Section 8.1).
c. In buildings where both a sprinkler system and a standpipe system are required by the referenced codes, the system shall be a combined sprinkler and standpipe system as per NFPA-14.
d. Detached buildings shall have their own individual automatic sprinkler system
e. The systems at areas without suspended ceilings shall comply with the following requirements:
   - Pitched branchlines shall not be gridded
   - Tees on branchlines shall have a minimum 25 mm (1") outlet and sprinklers shall be installed on nipples terminating with concentric reducer matching the sprinkler thread size.
   - Bush reducers shall not be used.

7.5.3. Standpipe and Hose Systems

a. The hose stations shall be capable of delivering the hose stream demand for the various hazards in buildings.
b. Fire main connections for standpipes shall be arranged so that a fire main break can be isolated without interrupting service simultaneously to both fixed protection and hose connections protecting the same hazard or area.
c. Choice of Class I, Class II, or Class III as per NFPA 14 systems shall be determined by the Fire Protection Design Basis.
d. 2 ½ valves for fire department's use at Class I and III systems shall be located in smoke/fire free enclosures (e.g. escape staircases).
e. Where pressures exceed the maximums allowed by NFPA 14, approved pressure reducing type hose valves shall be used.
f. Pressure reducing type of valves shall comply with FM Global Data Sheet 3-11.

g. The system shall be capable of providing minimum flowrate and pressure for the highest hose stations.
h. The locations of hose stations shall take into account safe egress for personnel operating hose lines.
i. Hose Threads. Hose threads on hydrants and standpipe systems shall be compatible with fire hose used by the responding fire departments.

7.6. Fixed non-water-based Suppression Systems

7.6.1. They shall be engineered by the manufacturer and installed by factory trained certified technicians.

7.6.2. Personnel warning signs shall be provided at areas protected by special extinguishing systems posing health hazard.

7.6.3. Protected areas shall be evacuated before discharge tests for any special extinguishing system posing health hazard.

7.6.4. Dry & Wet Chemical Extinguishing Systems shall comply with NFPA-17& NFPA-17A.

7.6.5. Carbon dioxide extinguishing systems shall be allowed only at locations specified in SAF-103 and shall comply with NFPA-12.

a. Facility Operators shall develop and implement specific procedures for entry into and work inside accessible spaces that are currently protected by fixed total flooding carbon dioxide systems.
b. Existing carbon dioxide systems shall be assessed with respect to the retroactive requirements for enhancing their safety of existing CO_2 systems as per NFPA 12, paragraphs 4.3.2 (safety signs), 4.3.3.6 and 4.3.6.6.1 (lockout valves), and 4.5.6.1 (pneumatic time delays and pneumatic predischarge alarms).

7.6.6. Clean agent systems shall be installed at locations specified in SBC and International Fire Code and shall comply with NFPA-2001.

a. They shall be engineered by the manufacturer and installed by factory trained certified technicians.

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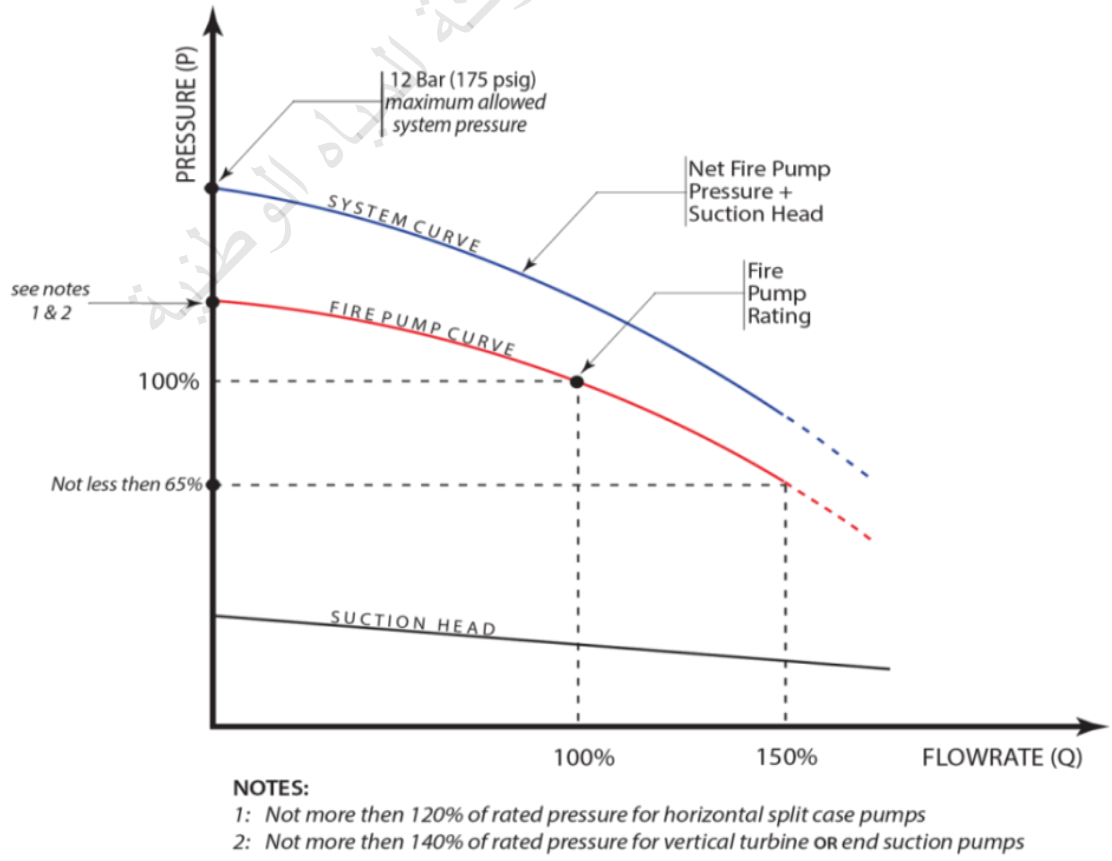
b. New HALON systems shall not be permitted.
c. Existing HALON systems shall be decommissioned as follows:
   - HALON system removal and replacement with another clean agent system shall be based on a formal fire risk assessment
   - HALON disposal shall be done by qualified/certified companies in accordance with the *Guidance for the EPA Halon Emission Reduction Rule: 40CFR, Part 82, Subpart H.*

7.7. Fire Exposure Protection

7.7.1. Steel structures shall be fire proofed.

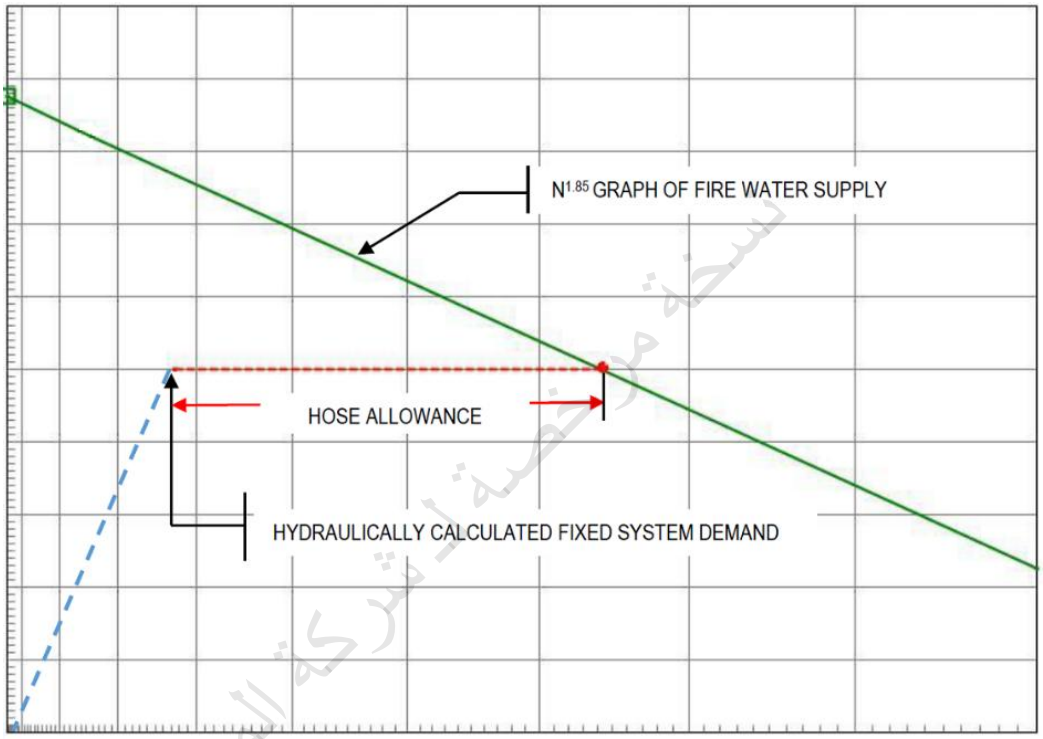
8. Figure

8.1. Fire Water System Pressure Limits



SAF-104 Fire Protection Systems and Equipment

8.1. Firewater Supply and Demand Graph



نسخة مرخصة لشركة المياه الوطنية

نسخة مرخصة لشركة المياه الوطنية

SAF-105

Flammable/Combustible Liquids in Portable Containers

Version 1.0

Safety & Fire Protection Directives
For Light Industrial and Non-industrial Facilities

2017

نسخة مرخصة لشركة المياه الوطنية

KINGDOM OF SAUDI ARABIA
MINISTRY OF INTERIOR
HIGH COMMISSION FOR INDUSTRIAL SECURITY

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نسخة مرخصة لـ شركة المياه الوطنية

SAF-105 Flammable/Combustible Liquids in Portable Containers

Version History

Item	Description	Issue Date
1	Version 1.0	• 5 Rajab, 1438 • 2 April, 2017

نسخة مرخصة لشركة المياه الوطنية

SAF-105 Flammable/Combustible Liquids in Portable Containers

نسخة مرخصة لشركة المياه الوطنية

SAF-105 Flammable/Combustible Liquids in Portable Containers

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SAF-105 Flammable/Combustible Liquids in Portable Containers

نسخة مرخصة لشركة المياه الوطنية

SAF-105 Flammable/Combustible Liquids in Portable Containers

1. Purpose

This directive defines the requirements for storage, handling, dispensing and use of flammable/combustible liquids in portable containers.

2. Scope

It applies to flammable/combustible liquids stored in portable containers whose individual capacities do not exceed the following:

- 60 gal (230 L) capacities for overpack drums
- 119 gal (450 L) for drums or other containers
- 660 gal (2500 L) for portable tanks
- 793 gal (3000 L) for intermediate bulk containers

3. Acronyms

FO: Facility Operator
Definitions in the references listed in Section 4 shall apply.

4. References

Building and Fire Codes
Saudi Building Code (SBC)
International Fire Code (IFC)
European Norm (EN)

EN 14470	*Safety Cabinets for Flammable and Explosive Products*
EN 14727	*Laboratory Furniture - Storage Units For Laboratories - Requirements And Test Methods*

Factory Mutual (FM) Data Sheets (DS)

FMDS 7-29	*Ignitable Liquid Storage in Portable Containers*
FM 6049	*Approval Standard for Storage Buildings and Lockers*
FM 6050	*Approval Standard for Storage Cabinets (Flam/Comb Liquids)*

National Fire Protection Association (NFPA)

NFPA 30	*Flammable and Combustible Liquids Code*
NFPA 68	*Standard on Explosion Prevention by Deflagration Venting*
NFPA 91	*Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids*
NFPA 505	*Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations*

نسخة من رخصة لشركة المياه الوطنية

Safety & Fire Protection (SAF) Directives

SAF-102 *Managing Safety, Health and Environment at Non-industrial facilities*
SAF-103 *Buildings for Non-industrial Facilities*
SAF-104 *Fire Protection Systems and Equipment for Non-industrial facilities*

Underwriter's Laboratories (UL)
UL 1275 *Standard for Flammable Liquid Storage Cabinets*

5. Deviations

The requirements herein are more stringent than the requirements of NFPA-30, IFC and SBC. Deviations shall be allowed when substantiated based on NFPA-30, IFC and SBC or when the storage meets the requirements of FM Data Sheet 7-29.

6. Portable Containers

6.1. Limitations

6.1.1. Portable container materials, their volumes and their characteristics shall be limited to what is specified in the Table 9.4.3 of NFPA-30 except non-metallic containers shall not be permitted for liquids whose flash points are lower than 94°C (200 F).

6.2. Safety Hardware

6.2.1. Portable tanks shall have provision for emergency relief venting. Top-mounted emergency relief vents must be capable of limiting internal pressure under fire exposure conditions to 0.7 Barg (10 psig) or 30 percent of the bursting pressure of the tank, whichever is greater.

6.2.2. Portable tanks shall also have at least one pressure-activated vent with a minimum capacity of 6,000 cubic feet of free air at 1 bar (14.7 psia) and 15°C (60F). These vents must be set to open at not less than 0.34 Barg (5 psig). If fusible vents are used, they shall be actuated by elements that operate at a temperature not exceeding 149°C (300F).

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7. Storage

7.1. Storage in Original Containers

7.1.1. Storage in original containers shall be allowed only in a fully sprinkler protected building.

7.1.2. Storage shall be limited to a single area on the ground level.

7.1.3. Storage volume shall be limited to:

115 Liters (30 Gallons) if Flash Point <23°C(73F)
460 Liters (120 Gallons) if 23°C(73F)<Flash Point<60°C(140F)
1265 Liters (330 Gallons) if 60°C(140F)<Flash Point<93°C(200F)
50600 Liters (13200 Gallons) if Flash Point>93°C(200F)

7.1.4. Means of containment shall be provided at the storage areas.

7.2. Storage in Flammable/Combustible Liquid Cabinets

7.2.1. Storage volumes in Section 7.1 may be increased when flammable/combustible liquid cabinets listed/approved as per UL-1275, FM-6050, EN-14470, EN-14727 (for Labs) are used for storing the portable containers.

7.2.2. No more than 30 gallons of Class 1 A and 120 gallons of combined Class 1A, 1B and 1C flammable liquids shall be stored in a single liquid storage cabinet.

7.2.3. No more than 3 liquid storage cabinets shall be used in the same control area.

7.3. Storage in Flammable Liquid Storage Rooms

7.3.1. When the requirements of Section 7.2 cannot be met, the portable containers shall be stored inside flammable liquid rooms.

7.3.2. Flammable/Combustible Liquid quantities shall be limited to:

a. 204 liters/m^2(5 gals/ft^2) if area< 13.8 m^2 (150 ft^2)
b. 407 liters/m^2 (10 gals/ft^2) if 13.8 m^2 (150 ft^2) <area <46 m^2 (500 ft^2)

7.3.3. Room's area shall not exceed 46.5 m^2 (500 ft^2) and the room shall be located on the ground floor and have an external wall with a secured external door.

7.3.4. The room shall have 2 hour fire resistant floor, ceiling and wall assemblies with 1 ½ hour fire resistant openings and also be protected by automatic sprinklers

7.3.5. Rooms shall be provided with containment (not less than 4" high) and a drainage system for sprinkler discharge.

7.3.6. No dispensing shall be allowed in liquid rooms.

7.4. Storage in Warehouses

7.4.1. When the requirements of Section 7.3 cannot be met portable containers shall be stored in a warehouse dedicated for flammable/combustible liquids.

7.4.2. Warehouses shall comply with SBC, IFC and NFPA-30 or FMDS 7-29.

7.5. Storage in Portable Buildings

7.5.1. Portable buildings complying with FM-6049 are permitted.

7.5.2. The class and quantity of flammable/combustible liquids stored in portable buildings shall as per the approval certificate.

7.6. Outside Storage

7.6.1. Outside flammable/combustible liquid storage shall not be allowed adjacent to any building.

7.6.2. Location, quantities, storage height, separation distances, fire protection shall comply with NFPA-30.

7.6.3. The storage area shall be graded to divert possible spills away from buildings or surrounded by a curb at least 6 in. (150 mm) high.

7.6.4. The curbed area shall have a storm drainage system.

7.6.5. Storage area shall be protected against tampering and trespassing.

7.6.6. Storage area shall be kept free of weeds, debris, and other combustible materials for a distance of at least 10 ft (3 m) around the perimeter of the stored materials.

7.6.7. A canopy shall be provided over the storage area. The canopy shall allow dissipation of heat or dispersion of flammable vapors and fire-fighting access and control.

8. Dispensing and Use Rooms/Buildings

Dispensing and use of flammable/combustible shall be allowed only in rooms or buildings and meet the requirements of this section.

8.1. Quantity Limitations

8.1.1. The maximum quantity of liquids shall not exceed aggregate sum of the following:

a) 25 gal (95 L) of Class IA liquids in containers
b) 120 gal (454 L) of Class IB, Class IC, Class II, or Class III liquids in containers
c) 1585 gal (6000 L) of any combination of the following:
   - Class IB, IC, II, or IIIA liquids in metal portable tanks or metal intermediate bulk containers, each not exceeding 793 gal (3000 L)
   - Class II or Class IIIA liquids in non-metallic intermediate bulk containers, each not exceeding 793 gal (3000 L)
d) 20 portable tanks or intermediate bulk containers each not exceeding 793 gal (3000 L) of Class IIIB liquids.

8.2. Design and Construction

8.2.1. Shall comply with SAF-103 except as noted herein when operations involve dispensing and use of Class flammable liquids whose flash points are lower than 94°C (200 F).

8.2.2. Construction shall be 2 hour fire resistant.

8.2.3. Rooms shall have an external wall and be equipped with an NFPA-68 explosion venting system.

8.2.4. Sprinkler protection shall be provided

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8.2.5. Spill confinement and drainage shall be provided.

8.2.6. Electrical equipment shall comply with NFPA-72.

8.2.7. Mechanical ventilation shall be provided. The system shall comply with NFPA-91.

8.3. Dispensing Methods

8.3.1. Fuel shall be dispensed into containers listed and approved for flammable/combustible liquids.

8.3.2. Flammable/combustible liquids shall be transferred by one of the following methods:

- Through a closed piping system
- By means of a device that has anti-siphoning protection and that draws through an opening in the top of the portable tank or container
- By gravity through a listed self-closing valve or self-closing faucet

8.3.3. If hose is used in the transfer operation, it shall be equipped with a self-closing valve without a hold-open latch in addition to the outlet valve. Only listed or approved hose shall be used.

8.3.4. Where pumps are used for liquid transfer, means shall be provided to deactivate liquid transfer in the event of a liquid spill or fire.

8.3.5. Means shall be provided to minimize generation of static electricity.

9. Handling Equipment

Equipment used for handling portable containers shall be suitable for the specific handling needs and shall comply with NFPA 505 as applicable.

نسخة من خطة لشركة الدراه الوطنية

10. Declaration of Compliance

The following form shall be processed and submitted to HCIS.

The Organization: _____

The Facility: _____

This is to certify that we are in compliance with the requirements of *SAF-105. Flammable/Combustible Liquids in Portable Containers* unless noted otherwise in the attachment.

Approved: _____
(Name of the Facility Manager)

_____
(Signature)

_____
(Date)

Official Stamp:

Attachment (if any exceptions):

نسخة ترخيصة لشركة المياه الوطنية

SAF-105 Flammable/Combustible Liquids in Portable Containers

نسخة مرخصة لشركة المياه الوطنية

SAF-106

Hazardous Materials in Portable Containers

Version 1.0

Safety & Fire Protection Directives
For Light Industrial and Non-industrial Facilities

2017

نسخة مرخصة لشركة المياه الوطنية

KINGDOM OF SAUDI ARABIA
MINISTRY OF INTERIOR
HIGH COMMISSION FOR INDUSTRIAL SECURITY

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نسخة مرخصة لـ شركة المياه الوطنية

SAF-106 Hazardous Materials in Portable Containers

Version History

Item	Description	Issue Date
1	Version 1.0	• 5 Rajab, 1438 • 2 April, 2017

نسخة مرخصة لشركة المياه الوطنية

SAF-106 Hazardous Materials in Portable Containers

نسخة مرخصة لشركة المياه الوطنية

SAF-106 Hazardous Materials in Portable Containers

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نسخة من خطة شركة المياه الوطنية

SAF-106 Hazardous Materials in Portable Containers

نسخة مرخصة لشركة المياه الوطنية

SAF-106 Hazardous Materials in Portable Containers

1. Purpose

This directive sets forth the minimum requirements for storage, use and handling of hazardous materials in portable containers.

2. Scope

This directive shall apply to the following hazardous materials used, handled and stored at facilities that are under the jurisdiction of HCIS.

(1) Corrosive solids, liquids, or gases
(2) Flammable solids
(3) Flammable gases
(4) Flammable cryogenic fluids
(5) Inert cryogenic fluids
(6) Inert gases
(7) Organic peroxide formulations
(8) Oxidizer solids or liquids
(9) Oxidizing gases
(10) Oxidizing cryogenic fluids
(11) Pyrophoric solids, liquids, or gases
(12) Toxic or highly toxic solids, liquids, or gases
(13) Unstable (reactive) solids, liquids, or gases
(14) Water-reactive solids or liquids
(15)Radioactive Materials

3. Acronyms & Definitions

Acronyms and definitions in the documents listed under Section 4 shall apply.

FO	Facility Operator
HMIS	Hazardous Materials Inventory Statement
HMMP	Hazardous Materials Management Plan
HAZMAT	Hazardous Material
MAQ	Maximum Allowable Quantities
MSDS	Material Safety Data Sheet

نسخة مرخصة لشركة المياه الوطنية

4. References

The requirements of the following references shall apply except as noted herein.

National Fire Protection Association (NFPA)

NFPA 1	*Fire Code*
NFPA 400	*Hazardous Materials Code*
NFPA 801	*Standard for Fire Protection for Facilities Handling Radioactive Materials*

Safety and Fire protection (SAF) Directives, HCIS, MOI

SAF-101	*General Requirements for Safety & Fire Protection Directives*
SAF-102	*Environmental, Health and Safety Management*
SAF-103	*Buildings for Industrial Facilities*
SAF-104	*Fire Protection Systems and Equipment*

5. Planning, Design, Construction and Operations

5.1. Planning, design and construction, operations

5.1.1. Planning, design and construction shall comply with SAF-101.

5.1.2. FOs shall utilize the services of a consultant with experience in the implementation of NFPA-400 to develop the following documentation when MAQs specified in Sections 5.2.1.2 through 5.2.1.13 and 5.4.1.2 of NFPA-400 are exceeded:

a. An HMMP reflecting requirements of Chapter 6, NFPA-400 shall be submitted. HMMP shall be modeled as per Annex C.3 of NFPA-400
b. An HMIS reflecting the requirements of NFPA-1 shall be submitted. HMIS shall be modeled as per Annex C.2 of NFPA-400
c. Both shall be revised when conditions change

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6. Classifications

6.1. Materials, wastes and hazards of contents

6.1.1. Classifications shall be in accordance with and as detailed in the Chapter 4 of NFPA-400:

a. High Hazard Level 1 Contents shall include materials that present a detonation hazard.
b. High Hazard Level 2 Contents shall include materials that present a deflagration hazard or a hazard from accelerated burning.
c. High Hazard Level 3 Contents shall include materials that readily support combustion or present a physical hazard.
d. High Hazard Level 4 Contents shall include materials that are acute health hazards.

6.1.2. Mixtures shall be classified in accordance with the hazards of the mixture as a whole by a qualified testing laboratory. Hazardous materials that have multiple hazards shall conform to the code requirements for each applicable hazard category.

6.1.3. High hazard wastes shall comply with the requirements of Chapters 1 through 9 and the material-specific requirements of Chapters 11 through 21 of NFPA-400 as applicable.

6.2. Material Specific Requirements

6.2.1. Ammonium Nitrate

Ammonium nitrate storage, use and handling shall comply with Chapter-11 of NFPA-400.

6.2.2. Corrosive Solids and Liquids

When the amount of corrosive solids or liquids exceeds the MAQs as set forth in Chapter 5 of NFPA-400, the storage, use, and handling shall comply with Chapter 12 of NFPA-400

6.2.3. Flammable Solids

When the amount of flammable solids exceeds the MAQ as set forth in Chapter 5 of NFPA-400, the storage, use, and handling of flammable solids shall comply with Chapter 13 of NFPA-400.

6.2.4. Organic Peroxides

When the amount of organic peroxides exceeds the MAQ as set forth in Chapter 5 of NFPA-400, the storage, use, and handling shall comply with Chapter 14 of NFPA-400.

6.2.5. Oxidizer Solids and Liquids

When the amount of oxidizer solids and liquids exceeds the MAQ as set forth in Chapter 5 of NFPA-400, the storage, use, and handling shall comply with Chapter 14 of NFPA-400.

6.2.6. Pyrophoric Solid and Liquids

When the amount of pyrophoric solids and liquids exceeds the MAQ as set forth in Chapter 5 of NFPA-400, the storage, use, and handling shall comply with Chapter 17 of NFPA-400.

6.2.7. Toxic or Highly Toxic Solids and Liquids

When the amount of toxic or highly toxic solids and liquids exceeds the MAQ as set forth in Chapter 5 of NFPA-400, the storage, use, and handling shall comply with Chapter 18 of NFPA-400.

6.2.8. Unstable (Reactive) Solids and Liquids

When the amount of unstable (reactive) toxic solids and liquids exceeds the MAQ as set forth in Chapter 5 of NFPA-400, the storage, use, and handling shall comply with Chapter 19 of NFPA-400.

6.2.9. Water-Reactive Solids and Liquids

When the amount of water-reactive solids and liquids exceeds the MAQ as set forth in Chapter 5 of NFPA-400, the storage, use, and handling shall comply with Chapter 20 of NFPA-400.

6.2.10. Compressed Gases and Cryogenic Fluids

When the amount of compressed gases and cryogenic fluids in portable and stationary containers, cylinders, and tanks exceeds the MAQ as set forth in Chapter 5 of NFPA-400, the storage, use, and handling shall comply with NFPA 52,54,55, 58, and 59 and Chapter 21 of NFPA-400.

7. Permissible Storage and Use Locations

7.1. Control Areas or Special Protection Required

7.1.1. Hazardous materials shall be stored in any of the following:

a. In control areas complying with Section 5.2 of NFPA-400
b. In occupancies complying with requirements for protection level 1, protection level 2, protection level 3, or protection level 4 in accordance with Section 5.3 of NFPA-400
c. In outdoor areas complying with Section 5.4 of NFPA-400.

7.1.2. Materials that pose hazard when exposed to sun, humidity, rain or other climatic conditions shall be stored in weather protected enclosures.

7.1.3. Occupancies in which high hazard contents are stored, used, or handled shall also comply with Chapter 6 of NFPA-400.

7.2. Radioactive Chemicals

7.2.1. Radioactive chemicals shall be stored in lead-lined special purpose cabinets and containers.

7.2.2. Protection for radioactive materials shall comply with NFPA-801.

8. Declaration of Compliance

The following form shall be processed and submitted to HCIS.

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SAF-106 Hazardous Materials in Portable Containers

Organization Name: _____

Facility Name: _____

This is to certify that we are in compliance with the requirements of *SAF-106. Hazardous Materials in Portable Containers* except as noted in the attachment.

Approved: _____
Name of the Facility Manager

_____
Signature

_____
Date

Official Stamp:

Attachment:

نسخة من رخصة لشركة المياه الوطنية

SAF-107

Water Treatment, Storage & Distribution Facilities

Version 1.0

Safety & Fire Protection Directives
For Light Industrial & Non-Industrial Facilities

2017

نسخة مرخصة لشركة المياه الوطنية

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نسخة مرخصة لـ شركة المياه الوطنية

SAF-107 Water Treatment, Storage and Distribution Facilities

Version History

Item	Description	Issue Date
1	Version 1.0	• 5 Rajab, 1438 • 2 April, 2017

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نسخة مرخصة لـ شركة المياه الوطنية

SAF-107 Water Treatment, Storage and Distribution Facilities

1. Purpose

This document and its references provide the minimum safety and fire protection requirements.

2. Scope

It applies to water treatment, storage and distribution, piped or motorized, to dispensing stations and end user facilities.

3. Acronyms and Definitions

AHJ	Authority Having Jurisdiction
FO	Facility Operator

4. References

Safety and Fire Protection Directives (SAF) for Light Industrial & Non-industrial Facilities

SAF-101	*General Requirements for Non-industrial facilities*
SAF-102	*Environmental, Health and Safety Management for Non-industrial facilities*
SAF-103	*Buildings for Non-industrial Facilities*
SAF-104	*Fire Protection Systems and Equipment for Non-industrial facilities*
SAF-105	*Combustible/Flammable Materials*
SAF-106	*Hazardous Materials*

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5. Safety, Health and Environment

5.1. Safety, Health and Environmental Management System

FOs shall develop and implement a Safety, Health and Environment management System that is aligned with:

5.1.1. Specific risks at water treatment, storage and distribution facilities.

5.1.2. SAF-102.

5.1.3. Requirements of the relevant AHJs.

5.2. Specific Risks and their management

The hazards and risks to be addressed shall include but not limited to the following:

5.2.1. Water treatment facilities shall be so located as to prevent emissions (e.g. foul odors from settlement ponds) from reaching communities.

5.2.2. Water quality shall:

a. Be commensurate with the intended use.
b. Comply with the standards of the relevant AHJ
c. Be monitored for compliance with the standards

5.2.3. FO shall put in place a process to ensure water truck tankers are suitable to haul potable water and deny service to those presenting risk to public safety and health.

5.2.4. FO shall institute a corrosion protection and monitoring program for water distribution piping and put in place a piping replacement program based on the data acquired through monitoring.

5.2.5. FO shall ensure water supply piping is connected to private water mains of customers via a backflow prevention device to prevent cross-contamination of public supply.

5.2.6. FO shall take precautions to prevent release of hazardous materials such as but not limited to chlorine as follows:

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a. Proper design, engineering and construction of systems handling hazardous materials (e.g. chlorination systems).
b. Safe operations by trained personnel.
c. Effective preventive maintenance
d. Routine inspections and immediate corrective actions, if required

5.2.7. FO shall have a specific emergency response for the hazardous material release incidents in accordance with SAF-102:

5.2.8. FOs shall have adequate resources in place to effectively and efficiently address service interruptions due to equipment failures.

5.2.9. FO shall comply with SAF-105 for storage and handling of combustible/flammable materials.

5.2.10. FO shall comply with SAF-106 for storage and handling of hazardous materials.

6. Fire Protection

Fire protection at facilities shall comply with SAF-103 and 104.

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SAF-108

Trains, Trainways, Stations and Support Facilities

Version 1.0

Safety & Fire Protection Directives
For Light Industrial Facilities

2017

نسخة مرخصة لشركة المياه الوطنية

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نسخة مرخصة لـ شركة المياه الوطنية

SAF-108 Trains, Trainways, Stations and Support Facilities

Version History

Item	Description	Issue Date
1	Version 1.0	• 5 Rajab, 1438 • 2 April, 2017

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نسخة مرخصة لـ شركة المياه الوطنية

SAF-108 Trains, Trainways, Stations and Support Facilities

1. Purpose

This document and its references provide the minimum requirements for general safety as well fire safety.

2. Scope

It applies to trains, trainways, stations and ancillary facilities including new systems, extensions of existing systems, new rolling stock, and to retrofitting existing rolling stock and equipment.

3. Acronyms and Definitions

AHJ	Authority Having Jurisdiction
FO	Facility Operator
Heavy Rail	Heavy rail refers to traditional high platform subway and elevated rapid transit lines.
Means of egress at Trainways	The trainway also serves as the means of egress for passengers. In an enclosed trainway/tunnel, the means of egress includes enclosed exits and cross passageways
Trainway	A railway track; the channel in a built-up area through which a train passes
Urban light rail	Light rail or light rail transit (LRT) is urban public transport using rolling stock similar to a tramway, but operating at a higher capacity, and often on an exclusive right-of-way.

4. References

The USA Code of Federal Regulations (CFR)

CFR 49 Transportation, Parts 200-272 *Overall Railway Safety Standards*

Federal Railroad Administration (FRA)

FRA Part 213	*Track Safety Standards*
FRA Part 214	*Railroad Workplace Safety*
FRA Part 215	*Railroad Freight Car Safety*
FRA Part 238	*Passenger Equipment Safety Standards*
FRA Part 239	*Passenger Train Emergency Preparedness*

International Union of Railway (UIC)

International Railway Standard (IRS) *All IRSs related to safety*

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National Fire Protection Association (NFPA)

NFPA 130 *Standard for Fixed Guideway Transit and Passenger Rail Systems*

NFPA 550 *Guide to Fire Safety Concepts Tree*

Safety and Fire Protection Directives (SAF) for Light Industrial & Non-industrial Facilities

SAF-101 *General Safety and Fire Protection Requirements*
SAF-102 *Managing Safety, Health and Environment*
SAF-103 *Buildings*
SAF-104 *Fire Protection Systems and Equipment*
SAF-105 *Combustible/Flammable Materials*
SAF-106 *Hazardous Materials*

5. Safety, Health and Environment

5.1. Safety, Health and Environmental Management System

FOs shall develop and implement a Safety, Health and Environment management System that is aligned with:

5.1.1. Specific hazards and risks at railways such as but not limited to:

a. Operational hazards/risks
b. Train accidents (collisions, derailments, level crossings)
c. Public behaviour at the platform train interface.

5.1.2. SAF-102.

5.1.3. Requirements of the Saudi Railway Commission (SRC).

6. Fire Safety

Fire safety goal (See NFPA-550) shall be accomplished as per NFPA-130. A formal analysis shall be submitted to HCIS.

Fire safety considerations shall include type of materials, material fire safety properties (flammability, combustibility, and smoke production), and potential fire hazards in order to control and/or limit the likelihood of a fire's occurrence, its growth rate, and severity.

Buildings and facilities shall comply with the SAF directives listed under Section 4 as applicable.

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7. Rolling Stock Fire Safety

7.1. Fire Safety Goal

Fire safety shall be achieved redundantly by prevention of fire ignition as well as by managing the fire impact within the rolling stock as stated herein:

7.1.1. Fire ignition shall be prevented by proper:

a. Insulation
b. Isolation
c. Electric power control at electrical equipment
d. Wiring and cabling.

7.1.2. Fire impact shall be managed by:

a. Limiting fire from spreading beyond the origin through segregation of electrical equipment from the vehicle's exterior
b. Separation of the equipment from the passenger compartment via fire-resistance-rated floor and roof assemblies.
c. Limiting the flammability, combustibility, and flame spread of the vehicle's interior, including seating, flooring, wall and ceiling lining materials, and vehicle insulation

8. Trainway Fire Safety

8.1. Fire Safety Goal

Fire safety shall be achieved redundantly by prevention of fire ignition as well as by managing the fire impact within the trainways as stated herein:

8.1.1. Fire ignition shall be prevented by:

a. Utilization of noncombustible rail ties and walking surfaces
b. Limiting combustible items to essential equipment
c. Complying with maximum flame spread, smoke development, and peak heat release rates in accordance with specific fire test standards.
d. Utilizing fire-retardant-treated wooden rail ties.
e. Utilizing fire-resistant, low smoke emitting power, communication, and signal wiring and cables installed within the trainway.

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f. Putting all conductors, except radio antennas, in armor sheaths, conduits, or enclosed raceways, boxes, or cabinets except in ancillary areas.

8.1.2. Fire impact shall be managed by:

a. Providing emergency ventilation along the path of egress from a fire incident in an enclosed or tunnel trainway is that is longer than 61m (200 ft).
b. Designing the emergency ventilation system to maintain tenable egress conditions for minimum duration of one hour, but not less than the required safe egress time.
c. Separating ancillary areas from trainway areas by two-hour fire-resistance-rated construction.

8.1.3. The maximum distance between exits and cross passageways shall not exceed 762 meters (2,500 feet).

8.1.4. Evacuation of passengers via trainway is considered the last option in a fire and emergency event.

9. Station Fire Safety

9.1. Fire Safety Goal

Fire safety shall be achieved by managing the fire impact within the stations as stated herein:

9.1.1. Fire shall be managed in ancillary spaces by means of:

a. Fire barriers
b. Automatic sprinkler systems
c. Emergency ventilation in enclosed stations
d. Smoke Management in enclosed stations

9.1.2. Exposure shall be managed as follows:

a. The basis of station platform design shall be to evacuate all passengers from the platform in four minutes and to reach a point of safety within six minutes.

b. Escalators shall be permitted to serve more than half of the required means of egress from a platform and station when, for enclosed stations, at least one enclosed exit stair or exit passageway provides continuous access from the platforms to the public way.

9.1.3. In enclosed stations, an emergency ventilation system is required to maintain tenable egress conditions for a minimum of one hour, but not less than the required safe egress time.

10. Emergency Ventilation

Emergency ventilation shall be a major component of fire safety in a tunnel (if any) trainway and enclosed station during a fire condition.

10.1. Design Basis

10.1.1. The design basis shall be the heat and smoke release rates from the combustible load of a vehicle and other combustible materials at the location of fire.

10.1.2. Tunnel trainway emergency ventilation systems shall exhaust to maintain tenable conditions at upstream side of the train.

10.1.3. Enclosed station emergency ventilation shall be designed to maintain tenable conditions for occupant evacuation.

10.1.4. Emergency ventilation fan assemblies downstream of exhaust airflow shall be designed to operate at a minimum of 150°C (302F) for one hour or for required safe egress time, whichever is greater.

11. Smoke Management System

In enclosed stations, a smoke management system shall be provided to maintain tenable egress conditions for a minimum of one hour, but not less than the required safe egress time.

12. Ancillary Facilities

Ancillary facilities shall comply with the SAF directives listed under Section 4.

SAF-108 Trains, Trainways, Stations and Support Facilities

نسخة مرخصة لشركة المياه الوطنية

SAF-109

Research Centers

Version 1.0

Safety & Fire Protection Directives
For Light Industrial & Non-Industrial Facilities

2017

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KINGDOM OF SAUDI ARABIA
MINISTRY OF INTERIOR
HIGH COMMISSION FOR INDUSTRIAL SECURITY

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SAF-109 Research Centers

Version History

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نسخة مرخصة لـ شركة المياه الوطنية

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نسخة مرخصة لشركة المياه الوطنية

نسخة مرخصة لـ شركة المياه الوطنية

1. Purpose

This document and its references provide the minimum safety and fire protection requirements

2. Scope

It applies to facilities where scientific research is conducted.

It is not intended for medical research facilities.

3. Acronyms and Definitions

AHJ	Authority Having Jurisdiction
FO	Facility Operator

4. References

Safety and Fire Protection Directives (SAF) for Light Industrial & Non-industrial Facilities

SAF-101	*General Requirements for Non-industrial facilities*
SAF-102	*Environmental, Health and Safety Management for Non-industrial facilities*
SAF-103	*Buildings for Non-industrial Facilities*
SAF-104	*Fire Protection Systems and Equipment for Non-industrial facilities*
SAF-105	*Combustible/Flammable Materials*
SAF-106	*Hazardous Materials*

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5. Safety, Health and Environment

5.1. Safety, Health and Environmental Management System

FOs shall develop and implement a Safety, Health and Environment management System that is aligned with:

5.1.1. Specific risks at scientific research facilities.

5.1.2. SAF-102.

5.2. Specific Risks and their management

The hazards and risks to be addressed shall include but not limited to the following:

5.2.1. FO shall take precautions to prevent release of hazardous materials in accordance with the SAF-102 as follows:

a. Proper design, engineering and construction of protective systems
b. Safe operations by trained personnel.
c. Effective preventive maintenance
d. Routine inspections and immediate corrective actions, if required

5.2.2. FO shall have a specific emergency response for the hazardous material spill/release incidents in accordance with SAF-102:

5.2.3. FO shall comply with SAF-105 for storage and handling of combustible/flammable materials.

5.2.4. FO shall comply with SAF-106 for storage and handling of hazardous materials.

6. Fire Protection

Fire protection at facilities shall comply with SAF-103 and 104.

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